

On the occurrence of the Hippolytid prawn, *Angasia armata* (Paulson) (Decapoda, Crustacea) in Bombay waters, its cannibalistic behaviour and its larvae

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(With three text-figures)

While hauling up bottom-set gill nets on 13th July, 1963, operated in waters of 36 m depth off Versova (Bombay suburban) for catching pom-frets (*Pampus argenteus*) live prawns clinging to the net dropped on the deck. It was thought that the prawn, with its characteristic elongated rostrum, was interesting material. The specimens, which fortunately included ovigerous females, were carefully brought to the laboratory for further observations but unfortunately died.

The prawn was identified as *Angasia armata* (Paulson) (Family : Hippolytidae).

Again in 1967 (19th January), the prawns were obtained in the gill nets and necessary precautions in the form of suitable shelters viz. nylon mops were provided in the tanks and observations were made on their behaviour under captivity.

This paper deals briefly with the taxonomy of the species, its cannibalistic nature in captivity and the two larval stages obtained in the laboratory.

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Angasia armata (Paulson)

(Fig. 1)

Tozeuma armatum Paulson, 1875, p. 99 ; Kemp, 1914, p. 106 ; 1916, p. 399 ; Kurien, 1954, p. 70 ; *Tozeuma armata* : Sewell, 1913, p. 350 ; *Angasia armata* : Balss, 1914, p. 48 ; Holthuis, 1947, pp. 61-63.

Description : The present material agrees more or less with that of the Siboga and Snellius expeditions, as described by Holthuis (1947). The rostrum is armed with 24-37 spines on lower border and measures more than $\frac{1}{2}$ to $\frac{3}{4}$ as long as rest of the body. Both, the antennal and pterygostomial spines are present on the carapace. The difference in the antennular-length of male and female specimens is, as pointed out by Holthuis (op. cit.), due to sexual dimorphism ; in the male the inner flagellum of antennule extends to the tip of the antennal scale, whereas in the female the antennule is distinctly shorter than the scaphocerite. In all the specimens, the difference in the size of the posteromedian spines of the 3rd, 4th and 5th abdominal segments was quite distinct, the spine of the 3rd being very high, much compressed with its tip bent backwards, though in 2-3 specimens only this tip was either broken or lost, that of the 4th segment was the smallest and not compressed and that of the 5th was high, compressed and distinctly longer than that of the 4th segment. As in specimens described earlier by Holthuis (1947) and Kemp (1914 and 1916), the pleuron of the 5th abdominal segment bears two spines, one on the upper portion and the other on the lower portion of the posterior margin of the pleuron.

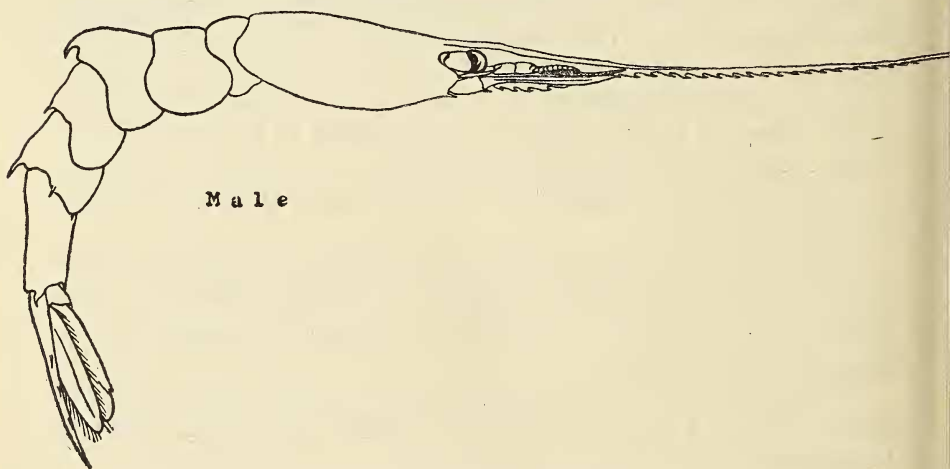


Fig. 1. *Angasia armata* (Paulson) ; adult (legs etc. not shown).

Material examined : 7 ovigerous females (46-59 mm) and 2 males (47-53 mm) collected from a depth of 36 m off Versova (Bombay) in July, 1963. Bottom—muddy.

9 ovigerous specimens of 44 to 47 mm length and 3 males of 41 to 45 mm collected from the depth of 66 m off Thana 40 miles north of Bombay, on 19-1-1967. Bottom muddy with coralline patches.

The colour in life is the same as described by Kemp (1916).

Remarks : *A. armata* has been recorded in Indian waters from Mandapam, Andamans and Burma on the east (Kemp 1916) and on the west from south-west Ceylon and Trivandrum (Kurien 1954). This, the first record of the species from Bombay waters, extends its distribution along the west coast from Trivandrum to north as far as Bombay.

The range of vertical distribution of the species is from 4 to 150 m.

Observations in captivity : In 1963, when these prawns were kept in a small aquarium tank, without shelters like weeds or nylon mops in the tank, the majority of the specimens invariably died within 24 hours. On examination, it was observed that in almost all the dead or dying specimens, the soft part at the junction of the cephalothorax and abdomen was severely injured and the few specimens still alive in the tank were observed to be preying upon on the soft parts of the dead or dying specimens, thus indicating their cannibalistic tendencies. To reduce the rate of mortality from cannibalism and to study the clinging behaviour of the prawns to the gill nets, nylon mops were suspended in the observation tanks.

Three to four mops of nylon fishing twine (210/12/3) were suspended in a small aquarium tank of 9"×12"×6", by tying each mop to a piece of cork at the top. The prawns immediately took shelter in the mops. After a little while, some specimens started clinging to others by holding on to their backs. When the mops were lifted out of water, most of the specimens, particularly those clinging to each other, did not leave the mops, despite vigorous shaking; some of the individual specimens darted away, leaving the mop for the water when they were just at the surface of the water. On re-introducing the mop with prawns into the tank, those, which were holding on to other prawns, either lost their grip or continued to hold on; whereas those, which were individually clinging on to the mop, either caught hold of another mop or continued to remain attached.

The behaviour of prawns holding on to each other, was interesting. The carrier-prawn would move vigorously on the mop attempting to dislodge the mounted-prawn.

When the carrier prawn was exhausted the mounted-prawn adjusted itself so as to lock its pereopods with the pleopods of the carrier-prawn and then attacked the soft part at the junction of the cephalothorax and abdomen, eventually killing the carrier-prawn. Dislodgement was rare and when it occurred, happened within 2-3 minutes. The reasons for

cannibalism are not known but on this account, several specimens were lost and to avoid this type of mortality the prawns had to be kept singly.

Larval Stages : Literature on the larvae of the genus *Angasia* (= *Tozeuma*) *carolinense* and *A. armata*, have, so far been described. Gurney (1937) described the 1st stage of *A. carolinense*, obtained in the laboratory. He also described two other forms, from the Great Barrier Reef plankton, as *Tozeuma* sp. B.R.I. and sp. B.R.II. In sp. I, he noted stages III to VIII but stage VII was absent. In sp. II, only the VI stage was present. Kemp (1916) described a post larva of *A. armata*.

Each berried female was kept separately in small aquarium tanks provided with sea water and aeration. Adults of *A. armata* inhabit seaweeds and to simulate the natural environment mops of nylon threads were suspended in the tanks, as described earlier in this paper. The prawns took shelter amongst the threads and eggs from two of the females hatched but the larvae could be reared only up to the IIInd zoeal stage in the laboratory. The method of rearing was as described elsewhere (Sankolli 1965).

FIRST STAGE LARVA

(Fig. 2)

Length of carapace	= 0.6 - 0.7 mm
Length of rostrum	= 1.0 mm
Length of abdomen	= 2.5 mm

Larva (Fig. 2, a) is long and slender and characterised by the presence of a long smooth rostrum and a posteromedian process on the 3rd abdominal segment. Eyes are sessile. Rostrum is smooth and longer than carapace. Carapace is smooth with no pterygostomial spine which is present in *A. carolinense* described by Gurney (1937). All the three maxillipeds are functional with 3 apical setae on their exopods. Abdomen is 5-segmented, the 6th segment being still fused to telson. Telson-process formula is 7+7, the 1st process being situated laterally. No anal spine.

Antennule (Fig. 2, b) : The outer ramus bears 4 aesthetascs. The inner ramus is represented by a long plumose seta.

Antenna (Fig. 2, c) : Biramous with a long, somewhat cylindrical scale which bears 10 marginal setae ; the outermost seta is a minute, delicate hair and the remaining are plumose. The distal part of the scale shows segmentation. Endopod is a long, narrow rod-like process which is serrated on its outer margin and is slightly longer than the scale. Ventral spine is present on the peduncle.

Mandible (Fig. 2, d): Mandibles of either side are slightly asymmetrical. The arrangement and structure of the teeth on the cutting edges is almost similar to that of *A. carolinense*.

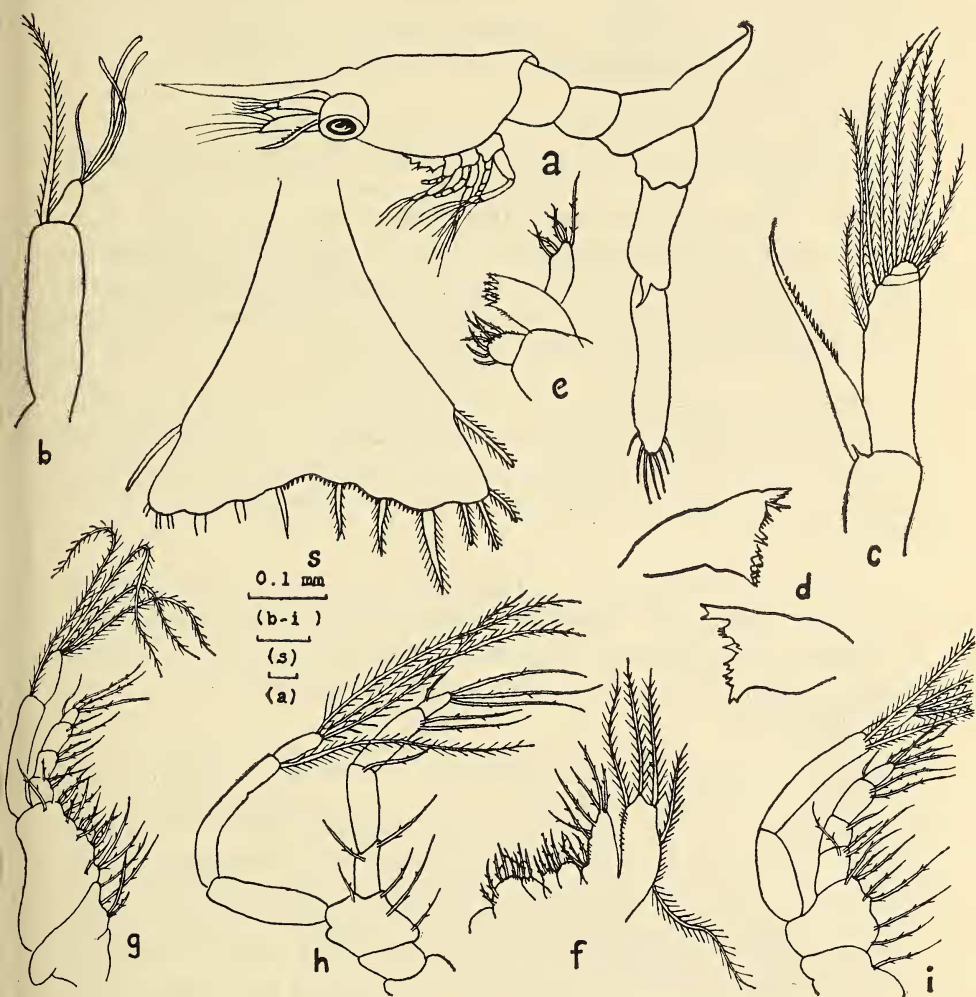


Fig. 2. *Angasia armata* (Paulson), First stage: (a) entire larva; (b) antennule; (c) antenna; (d) mandibles; (e) 1st maxilla; (f) 2nd maxilla; (g) 1st maxilliped; (h) 2nd maxilliped; (i) 3rd maxilliped; (s) telson.

First maxilla (Fig. 2, e) consists as usual, of a coxal and basal endites and a simple unsegmented palp. The coxal endite is armed with 6-7 bristle-like setae whereas the basal has 5-6 unequal serrated teeth. Palp shows a slight distal notch and bears in all 5 setae in 3 groups of 2, 2 and 1.

Second maxilla (Fig. 2, f) is of the usual form with setose coxal and basal endites, an endopod and a scaphognathite. Endopod has three inner lobes, the basalmost alone being very distinct. The arrangement of setae on endopod is 3 apical and 1, 2 and 3 on the 3 inner lobes. Scaphognathite bears 5 marginal plumose setae, the posterior seta being longer than the rest. There is a fringe of fine hairs on the inner margin of endopod and scaphognathite, and also on the outer margin of scaphognathite.

First maxilliped (Fig. 2, g): Endopod is 4-segmented and shorter than exopod. The first 3 segments bear 2 setae each on their inner margin. The last segment has 3 long terminal and 1 small outer setae. Exopod shows 3 indistinct segments and bears 3 apical and 1 subterminal setae. Basis is quite large, almost equal to the length of endopod and is lined with setae on the inner margin. Coxa has a prominent projection on outer margin and bears 4 setae.

Second maxilliped (Fig. 2, h): Endopod is similar to that of the first maxilliped but with 4 terminal setae on the last segment. Exopod bears 3 apical and 2 subterminal setae instead of 3 and 1 of the first maxilliped. Basis is much shorter than that of the first maxilliped and bears fewer setae.

Third maxilliped (Fig. 2, i): Endopod is 4-segmented and is almost as long as exopod. The first three segments bear 2, 1 and 2 setae each and the last segment which is the smallest, bears 1 small outer and 3 long terminal setae. Exopod is as in the first maxilliped with 3 apical and 1 subterminal setae.

Other appendages : No pereopod buds develop at this stage.

Abdomen : It is 5-segmented, the 6th segment being still fused to telson. The first 4 segments are slightly longer than broad and of about equal size. The 3rd segment has a characteristic posteromedian process which is pointed at the tip and directed forwards. This process is also present in *A. carolinense* but is smaller than in *A. armata*. The 5th abdominal segment is the longest, twice longer than broad and with a pair of large posterolateral spines as in *A. carolinense*. No pleopod buds.

Telson (Fig. 2, s): Somewhat triangular in outline with its proximal portion elongated and narrow. Process formula is 7+7, the 1st process is laterally situated. The posterior margin is slightly convex with a wide shallow median notch. In *A. carolinense*, all processes are of equal length but in the present species, only the 2nd to 4th are short but of equal length and rather closely placed; the 5th is the longest process. The 5th to 8th processes are more widely placed. The 1st to 4th processes terminate

bluntly, while the other processes are sharp. The posterior margin, in between processes 5 to 8, is serrated with minute spinules. No anal spine.

SECOND STAGE LARVA

(Fig. 3)

Length of carapace	= 0.8 mm
Length of rostrum	= 1.2 mm
Length of abdomen	= 3.2 mm

This differs from the first stage in the following characters: larger size, stalked eyes, endopod of the IIrd and IIIrd maxillipeds 5-segmented and

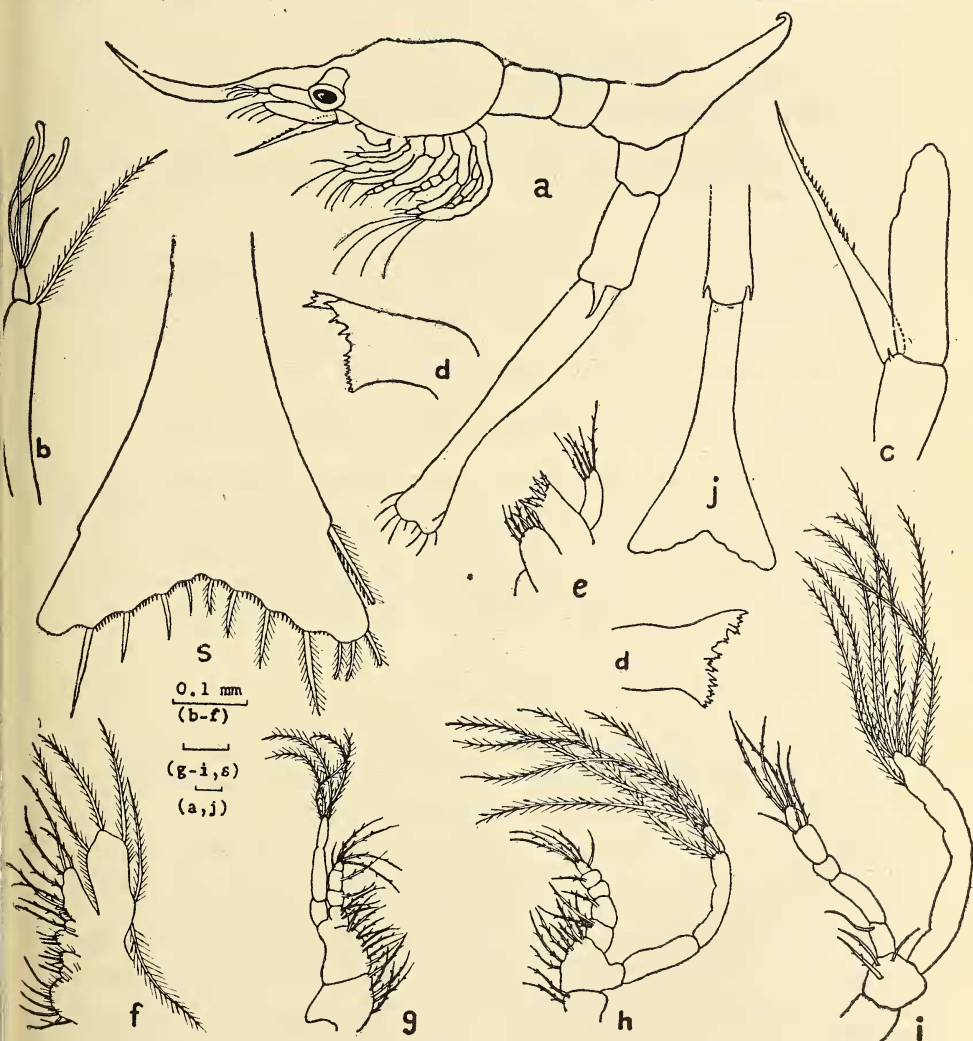


Fig. 3. *Angasia armata* (Paulson) Second stage: (a) entire larva; (b) antennule; (c) antenna; (d) mandibles; (e) 1st maxilla; (f) IIrd maxilla; (g) 1st maxilliped; (h) IIrd maxilliped; (i) IIIrd maxilliped; (j) abdomen showing spines of 5th segment; (s) telson.

exopods of the 3 maxillipeds bearing 4 apical setae each ; telson process formula $8+8$.

Antennule (Fig. 3, b) : Except for an additional aesthatasc on the outer ramus, there is no other change from stage I.

Antenna (Fig. 3, c) : Unfortunately, this appendage was not completely free from the moult of stage I. The number of setae on the scale, therefore, could not be ascertained. Endopod, however, is unchanged.

Mandible (Fig. 3, d) : No appreciable change. No palp is formed as yet.

First maxilla (Fig. 3, e) : No change except for slight increase in the number of setae on the coxal and basal endites.

Second maxilla (Fig. 3, f) : The coxal and basal endites, become more setose.

Maxillipeds : Except for the increase in number of setae an exopod which is 4, 6 and 7 respectively on the 1st, 2nd and 3rd maxillipeds (Fig. 3 g, h, i), there is no appreciable change.

Other appendages : No traces of pereopod buds.

Abdomen : There is no change except for increase in size.

Telson (Fig. 3, s) : It becomes a little narrower and more elongated than that in 1st stage. Process formula is $8+8$ and the 1st to 4th processes are blunt and remaining processes are sharp as in previous stage. The median notch of the posterior margin becomes narrower and the 8th pair of processes is situated on the border of the notch.

DISCUSSION

The 1st stage larvae of *Angasia armata* are similar to those of *A. carolinense* described by Gurney (1937). The pterygostomial spine of carapace is, however, wanting in the present species.

Based on the knowledge of the above 2 species, the early stages of *Angasia* can be distinguished by (1) long rostrum, (2) antennal endopod long, narrow and serrated, (3) mandibles with peculiar pectinate type of teeth, (4) Exopods of maxillipeds with 3 apical setae in stage I and 4 setae in stage II, (5) Telson with long, narrow basal portion widening distally, process formula $7+7$ with the 1st process being situated on the lateral margin ; no anal spine, (6) 3rd abdominal segment with a characteristic prominent, posteromedian spine and the 5th with a pair of postero-lateral sharp spines.

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